

DEPARTMENT OF NATURAL RESOURCES

DNR establishes the groundwater quality standards for the state and coordinates their implementation by diverse agencies and programs (ch. 160, Wis. Stats.). DNR works with operators of landfills, land spreading of waste, remediation and redevelopment of contaminated sites, to ensure that standards are met that avoid concentration of pollutants in groundwater. The DNR works with public water systems across the state to protect groundwater quality and quantity to provide safe and reliable drinking water supplies. DNR manages groundwater quantity (ss. 281.11, 12, 34, and 346, Wis. Stats.) DNR staffs the Groundwater Coordinating Council and collaborates with the UW-System on the joint solicitation for groundwater research and with the Wisconsin Geologic and Natural History Survey on an annual groundwater work plan.



DNR water supply specialists test a new water supply sampling method developed by the State Laboratory of Hygiene. The method will help public water systems distinguish whether the source of bacterial contamination is in the groundwater or from within the water system.

FY 2016 Highlights

- Owners of private and non-community public wells more routinely receive current information about arsenic levels in drinking water under new sampling protocol for pump work or a property transfer inspection
- Review and monitoring of municipal sludge, septage and industrial land-applied wastes uses a new GIS system to protect separation distances between waste application and community and school water supply wells.
- The Interagency Pharmaceutical Waste Working Group led by DNR and UW-Extension with diverse partners coordinated efforts, set up drug collection programs and developed informational materials. Keeping pharmaceuticals out of household and industrial waste streams is the main way to reduce the risk that the substances will reach groundwater through landspreading or septic systems.
- With financial support from the DNR, the Wisconsin Geological and Natural History Survey constructed a groundwater flow model for the Little Plover River watershed in Portage County. This model is a scientific tool for understanding the complexities of geology, groundwater recharge and discharge, surface-water flow, well development and use, and water balance. The model simulates the interactions among streamflow, pumping, and climate to provide users “what-if” evaluations of possible decisions involving water use or land-use changes. The Little Plover River Basin was chosen for this pilot study because the river has been the focus of recent management concern and because a great deal of hydrogeologic data already exists for this area.

Details of Ongoing Activities

The DNR programs that protect and manage groundwater are as follows:

Drinking Water and Groundwater (DG) – Regulates public water systems, private drinking water supply wells, well abandonment, and high capacity wells. DG is responsible for adoption and implementation of groundwater quality standards contained in ch. NR 140, Wis. Adm. Code, and works closely with other programs and agencies to implement Chapter 160, Wis. Stats., including groundwater monitoring, data management, hydrogeologic advice, and staffing the Groundwater Coordinating Council. Groundwater quantity provisions (2003 Wisconsin Act 310, codified at s. 281.34, Stats. and ch. NR 820) and the Great Lakes Compact (2007 Wisconsin Act 227, codified at ss. 281.343 and 281.346, Stats.) are also implemented by DG. The program also coordinates the state's Wellhead Protection and Source Water Protection programs. See

<http://dnr.wi.gov/topic/DrinkingWater/> and <http://dnr.wi.gov/topic/Groundwater/>.

Remediation and Redevelopment (RR) – Oversees response actions at spills, hazardous substance release sites, abandoned containers, drycleaners, brownfields (including the Site Assessment Grant program through 2010), “high priority” leaking underground storage tanks, closed wastewater and solid waste facilities, hazardous waste corrective action and generator closures, and sediment cleanup actions, all of which are closely related to groundwater issues. See

<http://dnr.wi.gov/topic/Brownfields/> and <http://dnr.wi.gov/topic/Brownfields/Cleanup.html>.

Waste and Materials Management (WMM) – Regulates and monitors groundwater at proposed, active, and inactive solid waste facilities and landfills. WMM reviews investigations of groundwater contamination and implementation of remedial actions at active solid waste facilities and landfills. WMM also maintains a Groundwater and Environmental Monitoring System (GEMS) database of groundwater quality data from over 600 solid waste facilities and landfills and uses reports from GEMS to evaluate whether sites are impacting groundwater quality. See

<http://dnr.wi.gov/topic/Landfills/gems.html>.

Water Quality (WQ) -- Regulates the discharge of municipal and industrial wastewater, by-product solids and sludge disposal from wastewater treatment systems, and wastewater land treatment/disposal systems. WQ also issues permits for discharges associated with clean-up sites regulated by WQ for the RR program. See <http://dnr.wi.gov/topic/Wastewater/> and

<http://dnr.wi.gov/topic/TMDLs/>.

Watershed Management (WT) – WT has primary responsibility for regulating stormwater and agricultural runoff, as well as managing waste from large animal feeding operations. See

<http://dnr.wi.gov/topic/Watersheds/>, <http://dnr.wi.gov/topic/SurfaceWater/> and <http://dnr.wi.gov/topic/Waterways/>.

Drinking Water and Groundwater Program

Groundwater Quality Standards Implementation

Chapter 160, Wis. Stats., requires the DNR to develop numerical groundwater quality standards which consists of enforcement standards and preventive action limits for substances detected in, or having a reasonable probability of entering, the groundwater resources of the state. Chapter NR 140, Wis. Adm. Code (<http://legis.wisconsin.gov/rsb/code/nr/nr140.pdf>), establishes these groundwater standards and

creates a framework for their implementation. Groundwater quality standards are set for 138 substances of public health concern, 8 substances of public welfare concern and 15 indicator parameter substances in ch. NR 140.

Revisions to ch. NR 140 groundwater quality standards were last adopted by the Legislature in 2010. Following the required schedule, DNR has canvassed agencies for new substances that have been detected in or have a reasonable probability of entering groundwater to start the process of determining whether any new or revised standards are needed.

To help ensure awareness of known health risks, DNR updated its [table](#) listing health and welfare based enforcement standards (ch. NR 140), state public drinking water standards (ch. NR 809), and established health advisory levels (HALs) for substances in water reflect new or revised health advisory levels set this year. This table of regulatory standards and advisory levels provides a useful source of information to members of the public concerned about the safety of their drinking water, and it is also a valuable resource for agency staff and consultants involved with groundwater contamination and remediation actions. Links to resource web sites allows users to obtain additional toxicological and health related information on many of the substances listed in the table.

DNR continued to provide training to new staff in runoff management and drinking water programs on implementation of groundwater quality standards, including training for landspreading discharge permit writing and animal waste drinking water well contamination response. Groundwater and runoff program staffs regularly consult on groundwater quality issues that arise in agricultural and urban runoff programs. Such coordination is critical in obtaining statewide consistency on how the DNR evaluates and reduces risk of groundwater contamination associated with regulated activities.

DNR staff actively participated in the technical work group on Wisconsin-specific provisions to the NRCS conservation practice standard for agricultural nutrient management ([NRCS Code 590](#)). All states are updating their provisions to be consistent with updated federal standards, including revisions related to nitrogen. Participants in federal and some state farm programs, as well as some state permit holders, must comply with the federal conservation practice standards.

Groundwater Quantity Program Implementation

The DNR is authorized under ch. 281, Wisc. Stat. to regulate wells on any property where the combined capacity of all wells on the property, pumped or flowing, exceeds 70 gallons per minute (100,000 gallons per day). Such wells are defined as high capacity wells. Since 1945, the DNR has reviewed proposed high capacity wells for compliance with applicable well construction rules and to determine whether the well would impair the water supply of a public utility well. The DNR review of high capacity wells has been evolving over the last decade as described in the paragraphs below. To improve efficiency and consistency of review, DNR implemented a ‘lean’ project in 2013 to address the broadened scope and increased complexity of the high capacity review process for non-potable wells. The project increased efficiency by streamlining high capacity application and approval forms and eliminated duplication within the review process.

In May of 2004, the statutes regarding high capacity wells were expanded through 2003 Wisconsin Act 310 to give the DNR additional authority to consider environmental impacts of proposed wells on critical surface water resources and springs. DNR may deny or limit an approval to assure that proposed high capacity wells do not cause significant adverse environmental impacts to these valuable water resources.

The Act 310 changes are implemented primarily through ch. NR 820, Wis. Adm. Code. NR 820 provides a mechanism for evaluating proposed high capacity wells to determine whether the well will have a significant adverse environmental impact on large springs, trout streams, or outstanding and exceptional resource waters. DNR water use section staff implement the programs created by Act 310 including reviewing applications, managing data, and collecting water withdrawal reports.

The DNR changed its procedures in July 2011 in response to a 2011 Wisconsin Supreme Court decision to review each application for a new high capacity well to determine whether the well, along with other high capacity wells on the contiguous property, would result in significant adverse environmental impacts to waters of the state – which includes all streams, lakes, wetlands, public and private wells. Section NR 820.12(19), Wis. Adm. Code defines significant adverse environmental impact as:

Alteration of groundwater levels, groundwater discharge, surface water levels, surface water discharge, groundwater temperature, surface water temperature, groundwater chemistry, surface water chemistry, or other factors to the extent such alterations cause significant degradation of environmental quality including biological and ecological aspects of the affected water resource.

If the DNR determined the proposed well could directly result in significant adverse environmental impacts, the DNR would either deny the well application or request that an applicant modify their proposed construction or operation of the well to prevent such impacts. DNR based the need to modify or deny an application on the projected impacts to the affected water resource, e.g., estimated reductions in stream flow or lake level, and the resultant impacts to water temperature, the fishery and other ecological aspects of the stream or lake. In conducting these assessments, DNR considered site-specific hydrogeology, separation distance between the well(s) and the water resource, the hydrology and characteristics of potentially-affected surface waters, construction details of nearby wells, characteristics of the proposed wells such as construction, pump capacity, and the water use and pumping schedule for the proposed well and any other existing wells on the property. This version of the technical review methodology was in place from July 2011 through May 2016.

In May 2016 the Wisconsin Attorney General issued a formal opinion (OAG-01-16) regarding the DNR's authority to consider environmental impacts when reviewing high capacity well applications. The Attorney General concluded that through the adoption of 2011 Act 21 (§ 227.10(2m)), "[t]he Legislature has defined the parameters in which DNR can act to protect the state's navigable waters and additionally has clarified the ways in which DNR can regulate non-navigable waters." (OAG ¶52). The Attorney General concluded that section 227.10(2m), Stats., prohibits the DNR from conducting an environmental review of a high capacity well unless it is in one of the specific categories identified in Wis. Stat. § 281.34, such as a well in a groundwater protection area; with a water loss of more than 95 percent of the amount of water withdrawn; or that may have a significant environmental impact on a spring (these categories are specified in Wis. Stat. § 281.34(4)); or if it may impair the water supply of a public utility (as described in Wis. Stat. § 281.34(5)). According to the Attorney General, the Department lacks explicit authority to review the environmental impact of wells outside of those specific categories identified in Wis. Stat. § 281.34. High capacity well reviews are conducted in accordance with the Attorney General opinion as of June 2016.

Great Lakes Compact and Implementation of 2007 Act 227

The Great Lakes—St. Lawrence River Basin Water Resources Compact (Compact) took effect on December 8, 2008 following ratification in each of the eight Great Lakes States and Congress' consent.

DNR water use section staff implements Compact-related programs including authorizing permits, implementing the water conservation and efficiency program, reviewing diversion applications, and working in conjunction with groundwater quantity staff to collect annual water withdrawal reports.

The DNR has promulgated four administrative rules to implement the Compact and associated statewide water use legislation. Three of these rules took effect January 1, 2011: Water Use Registration and Reporting (ch. NR 856); Water Use Fees (ch. NR 850); and Water Conservation and Water Use Efficiency (ch. NR 852). The Water Use Permitting rule (ch. NR 860) took effect in December 2011. Three additional rules are still in the drafting stage. These rules include Water Supply Service Area Planning, Water Loss and Consumptive Use, and Water Use Public Participation.

Water Use Registration and Reporting

Following implementation of the Compact, all new or increased withdrawers that have the capacity on their property to withdraw 100,000 gallons per day (gpd) or more for 30 days must register with the WDNR prior to withdrawing groundwater or surface water. This is typically done in conjunction with other approval or permitting procedures.

WDNR continues to upgrade water use data management systems, improve existing registration data, and expand data collection methods. These efforts resulted in an increase in withdrawal report response rates from below 50 percent in 2008 to 79 percent in 2010. These improvements continued so that the reporting response rate for 2013 – 2016 is 95 percent annually.

Water Withdrawal Registrations by Source Type and Major Basin (2016)

| | Great Lakes Basin | Mississippi River Basin | Total |
|---------------|-------------------|-------------------------|--------------|
| Groundwater | 3,959 | 10,890 | 14,849 |
| Surface Water | 392 | 666 | 1,058 |
| Total | 4,351 | 11,556 | 15,907 |

Persons with registered withdrawals must measure or estimate their monthly withdrawal volumes and report the previous calendar years' monthly water use by March 1 of each year. These reports are collected and analyzed for errors and inconsistencies. The compilation of more than five years of water use reporting data has allowed DNR to assess trends in water use over time. Summary analysis is conducted on reported withdrawals and an annual water withdrawal reporting summary is made publicly available on the [WDNR website](#). Individual reports are also provided upon request to governmental partners, researchers, businesses and private individuals.

Water Conservation and Water Use Efficiency

Ch. NR 852, Wis. Adm. Code establishes a mandatory water conservation and water use efficiency program for new or increased Great Lakes Basin surface water and groundwater withdrawals. In addition, mandatory conservation is required for any new or increased diversions of Great Lakes water and water withdrawals statewide that would result in a water loss of two million gallons per day or more. The rule identifies conservation and efficiency measures that withdrawals subject to the mandatory program must meet.

The rule helps guide a statewide voluntary water conservation and efficiency program which focuses on providing information and education, identifying and disseminating information on new conservation and efficiency measures, and identifying water conservation and efficiency research needs. The program is coordinated with the Public Service Commission and the Department of Safety and Professional Services.

DNR is developing a statewide set of conservation standards for agricultural irrigation with partners including the University of Wisconsin, environmental non-profit organizations and the Wisconsin Potato and Vegetable Growers. Participation in the Conservation Standards Program will require growers to report specific data such as cropping rotations, acreages and irrigation practices. In addition, growers will be expected to report economic factors so that the savings and efficiencies from water conservation can be calculated. DNR staff also began working with individual golf courses, the University of Wisconsin, USGA and the Wisconsin Golf Course Superintendents Association to benchmark irrigation withdrawals and identify practices that conserve the most water at the greatest cost savings.

Water Use Permits

Water Use Permits are required for Great Lakes Basin groundwater or surface water withdrawals averaging 100,000 gallons per day or more in any 30-day period. General permits (valid until 2036) are required for withdrawals of 100,000 gallons per day averaged over 30 days up to 1,000,000 gallons of water for 30 consecutive days. Individual permits (valid for 10-years) are required for withdrawals of 1,000,000 gallons per day or more for 30 consecutive days. Chapter NR 860, Wis. Adm. Code prescribes a review process for the individual permits requires and additional environmental review. Since December 8, 2011, 207 permits have been issued to new or increased withdrawals in the Great Lakes Basin.

Water Use Fees

Wisconsin Act 28 contained statutory language directing the DNR to collect water use fees to fund Great Lakes Compact implementation and water use program development in Wisconsin. The statute directs that all persons with water supply systems with the capacity to withdraw 100,000 gallons per day or more must pay an annual \$125 fee per property. Act 28 also directed the DNR to promulgate a rule imposing an additional fee on Great Lakes Basin water users withdrawing more than 50 million gallons per year. That rule, ch. NR 850, Wis. Adm. Code, prescribes a tiered system for additional Great Lakes Basin fees on withdrawals exceeding 50 million gallons per year. Water use fee revenue is used to: document and monitor water use through the new registration and reporting requirements; implement the Great Lakes Compact through water use permitting and regulate diversion of Great Lakes Basin waters; help communities plan water supply needs; build a statewide water conservation and efficiency program; and to develop and maintain a statewide water resources inventory.

Industrial Sand Mining

As noted in previous sections, DNR reviews high capacity wells including those associated with industrial sand mining (ISM) operations in accordance with existing Wisconsin statute and administrative code. Each facility is unique, and each may present potential impacts to proximal water resources. In an effort to better understand the impact of water use related to current and proposed ISM facilities, DNR is working with Chippewa County, the WGNHS, and the USGS to model groundwater conditions.

While sand has been mined for industrial use in Wisconsin for over a hundred years. the recent boom in industrial sand mining for use in the energy sector has created regulatory challenges as new programs

adjust to a new major industry,. Concerns have been raised over potential for contamination from flocculants used during sand processing. DNR is working with Chippewa County as they evaluate potential risks associated with these chemicals. Exploratory boreholes have been found in proximity to ISM facilities that have not been properly filled and sealed, which can create a conduit for contaminants to reach groundwater. DNR is providing technical assistance on a project evaluating potential groundwater quality impacts associated with ISM facilities. The project is focused on elevated concentrations of metals and pH fluctuations in stormwater ponds and will be led by DNR's runoff management program.

Well Construction and Private Wells

DG sets and enforces minimum standards for well construction, pump installation, and well filling and sealing through ch. NR 812, Wis. Adm. Code. The standards are intended not only to provide health protection, but also to protect groundwater. DG licenses and educates well drillers and pump installers under ch. NR 146, Wis. Adm. Code so that they are qualified to construct wells in a way that meets standards and won't contaminate groundwater.

Advance notification to DNR is required for all new and replacement well construction. After construction, drillers submit Well Construction Reports to the DNR describing the construction of each well drilled. Private Water Supply staff enforce minimum well construction standards by conducting compliance inspections to observe wells during construction, and reviewing well construction reports and associated sampling. During the past year violations have included: failing to obtain well water quality samples, failure to notify well owners of unsafe water test results, and well drilling or pump installing by unlicensed contractors.

DNR worked with industry groups to implement and reinforce the requirements of October 2014 rule revisions to NR 146 and NR 812, Wis. Adm. Code. DNR sends monthly emails to a GovDelivery list of drillers and installers, with news and updates, and refers people to an updated web page with information and resources for the industry. DNR issued new Heat Exchange Driller licenses to 43 individuals who met eligibility requirements and passed an examination. DNR staff reviewed data to determine if additional nitrate and arsenic sampling requirements for pump work are being met, and follow up any noncompliance. Inspectors, property owners and real estate agents continue to have questions about property transfer well inspection requirements. Lender requirements during a real estate transaction often result in a noncomplying well being brought into compliance, or a new well being constructed.

DNR Private Water Supply staff presented code training to drillers and pump installers at ten Continuing Education sessions sponsored by the Wisconsin Water Well Association and Wisconsin Geothermal Association. Based on a 2015 customer survey of license holders, many individuals would like more options for continuing education, including different training providers, and on-line or hands-on training. DNR will implement changes to the continuing education process starting in 2017, to respond to these customer requests.

Private Water Supply staff are often the first-responders to complaints regarding the contamination of private wells. Well contamination by manure has been an increasing problem in recent years. Using field investigation and analytical tools for investigating the source of microbial contamination – known as MST sampling – DG staff are able to determine whether fecal contamination is due to grazing animal manure rather than human sources. Agency news releases to both the agricultural community and general media emphasize ways to avoid contamination and encourage regular sampling and well inspection by

private well owners. Joint training for DG staff and DNR animal waste specialists is held each year to increase staff efficiency and effectiveness in responding to manure contamination emergencies.

DG encourages private well owners to test their wells annually for bacteria, and other contaminants they may be concerned about. Private Water staff recently updated the popular web page titled “[What’s Wrong with My Water?](#)” to help answer commonly-asked questions about private well water quantity, help well owners diagnose their aesthetic water quality problems, and provide DNR water supply institutional knowledge.

DG continues to develop electronic tools for management of well construction, well abandonment, and other data. An on-line Well Abandonment Report system, which allows licensed individuals to electronically submit required well filling and sealing reports has been in use for a year, and electronic filing of these reports will be required by July 1, 2016. DG is currently developing an electronic system for submitting well construction reports, and continuing to implement last year’s LEAN project by developing an electronic license renewal option for licensed drillers and pump installers.

Public water systems

DNR’s Public Water Supply (PWS) program oversees the drinking water quality provided by public water systems [ch. NR 809 (Safe Drinking Water), Wis. Adm. Code]. Working in cooperation with owners and operators of water systems, the PWS program ensures that samples are collected and analyses completed to determine if the water meets federal Safe Drinking Water Act (SDWA) standards. The PWS program also regulates the operation of public water systems through ch. NR 810 and the general design and construction of community water systems through ch. NR 811. Additionally, the PWS program works to educate water system owners and operators concerning proper operation and maintenance of water systems to ensure safe drinking water for Wisconsin consumers.

The PWS program maintains data about Wisconsin’s drinking water and groundwater quality through the [Drinking Water System database](#). The Drinking Water System is an important tool used to efficiently enforce SDWA regulations for public water systems. It contains the monitoring and reporting requirements for each public water system and their drinking water sampling results. It also includes violations for any missing requirements and exceedances of the maximum contaminant levels (MCLs).

DNR maintains an electronic data system (EMOR) to accept and store monthly operating report data from public drinking water systems. EMOR contains required documentation of a system’s operations such as monthly pumpage, chemical usage for treatment, chlorine residual, turbidity, and temperature. EMOR generates data reports to monitor treatment operations and make efficient water quality and quantity management decisions.

Public water systems continue to face rising nitrate levels. At the top risk tier, municipal water systems must take immediate action if a nitrate MCL of 10 mg/L is observed (e.g., take well off-line, blend, treat, etc.). At the lowest risk tier, transient non-community systems, which include taverns, restaurants, churches, and campgrounds, are required to post notices warning customers of the exceedance and to provide bottled water to infants and pregnant women. Rising nitrate concentrations are a result of increasing concentrations in groundwater caused by land use activities and weather patterns. The public water supply program continues to work with other DNR programs and external partners to reduce nitrate in groundwater and surface water.

The PWS program is working with public water systems to implement the federal revised total coliform

rule (RTCR). Wisconsin has adopted a “find-and-fix approach” so that when bacterial contamination potential is detected by the presence of total coliform, DNR and water system operators investigate to find the cause, take action to fix it, and monitor to ensure public health protection. Among many RTCR implementation activities, water supply specialists tested new water supply sampling methods developed by the State Laboratory of Hygiene. The method will help public water systems distinguish whether the source of bacterial contamination is in the groundwater or due to a defect of the water system.

For additional information about the Public Water Supply Program you can review the current [Annual Compliance Report](#).

Wellhead protection

The goal of Wisconsin's Wellhead Protection (WHP) program is to reduce the risk of groundwater contamination in areas contributing groundwater recharge to public water supply wells, consistent with the state's overall goal of groundwater protection. A WHP plan is required for new municipal wells and must be approved by the DNR before the new well can be used. A WHP plan is voluntary for any public water supply well approved prior to May 1, 1992. DNR promotes and encourages but does not require wellhead protection planning for all wells. With planning assistance from Wisconsin Rural Water Association (WRWA), 11 communities completed WHP plans this year (4 required and 7 voluntarily).

DNR and WRWA are working together on pro-active strategic interventions to support wellhead protection actions in selected communities with wells susceptible to contamination. In particular, DNR, WRWA and other partners are developing and using groundwater monitoring, modelling and related tools in Spring Green, Fall Creek and Waupaca to demonstrate a voluntary community-based approach to rising nitrate levels. The village of Luck, WI has updated its WHP plan, participated in groundwater teacher workshops and is evaluating new spill prevention and remediation and redevelopment opportunities with support from DNR and WRWA. Unluckily, several contaminant plumes have the potential to affect the village's two municipal wells.

DNR continues to measure and report to US EPA on the percent of public water systems that are protected by substantial implementation of wellhead protection. In 2014, 15% of Wisconsin public water systems were protected by implementation of a WHP plan. In FY14, approximately 20 communities submitted wellhead protection plans to the DNR. Over 400 communities now have a WHP plan for at least one of their wells.

DNR maintains a [web page](#) with a variety of information aimed at encouraging and supporting water utilities in protecting their water supplies from potential sources of contamination.

DNR staff from a variety of water programs completed several collaborative projects to more effectively align management of both phosphorus and nitrogen losses to lakes, streams and groundwater. Different chemical behavior and separate Clean Water and Drinking Water federal laws make coordination somewhat challenging. Wisconsin's Nutrient Reduction Strategy and its newly-revised Nonpoint Source Program Plan now more thoroughly address both groundwater and surface water.

For the fourteenth year in a row, DNR staff worked with the Groundwater Center at the Center for Watershed Science and Education (CWSE) and the Wisconsin Geological and Natural History Survey (WGNHS) to sponsor three groundwater workshops for teachers in January and February. Educators from 24 schools centers took part in the workshops and were able to take a free groundwater model back to their school. Besides learning how to use the groundwater model, the educators received groundwater

resources to incorporate groundwater concepts into their classroom. The intent of the workshops is to provide information for teachers to educate students – and their parents – on the importance of protecting groundwater in their own communities. With funding from an EPA WHP grant, groundwater models have been given to over 300 schools or nature centers since 2001 and nearly 600 educators have received hands-on training in using the model effectively.

DNR and WRWA staff continues to coordinate their assistance to local protection efforts. WRWA staff work on plans for individual communities and area wide plans for multiple water supply systems. DNR staff reviewed draft plans and ordinances and provided technical advice to local officials responsible for carrying out wellhead protection.

Groundwater Information and Education

In 2014, the Groundwater Coordinating Council Report to the Legislature went on-line in interactive format. Web visits and time spent at the site increased substantially. Phone inquiries about the subject matter in the report were received for the first time in over five years.

Well drillers and pump installers, water testing providers, local health and conservation departments, health care providers and many individuals requested and received hundreds of thousands printed publications on groundwater. Among the most-frequently requested items were: Nitrate, *Groundwater: Wisconsin's Buried Treasure* publication, and the *Groundwater Study Guide* packet.

Groundwater Monitoring and Research

Chapter 160 of the Wisconsin Statutes requires the DNR to work with other agencies and the Groundwater Coordinating Council (GCC) to develop and operate a program for monitoring and sampling groundwater to determine whether harmful substances are present (s. 160.27, Wis. Stats.). The DNR has also supported groundwater monitoring studies evaluating existing design and/or management practices associated with potential sources of groundwater contamination. The intent of these studies is to reduce the impacts of potential sources of contamination by changing the way land activities that may impact groundwater are conducted. See the “Benefits” tab on the [GCC website](#) for more information on the benefits from DNR’s monitoring studies.



Based on measured stream flow and groundwater levels, the Little Plover River groundwater flow model was developed to help people understand the groundwater system and inform management decisions.

Four [projects](#) began in FY14 for a total investment of \$364,332 and seven [new projects](#) were selected through the Joint Solicitation process for funding in FY15. Final reports and 2-page research summaries are available for many projects from the [Water Resources Institute website](#).

DNR has committed \$80,000 annually to the ongoing maintenance of the statewide groundwater monitoring network. Groundwater level monitoring is one part of the overall groundwater monitoring strategy. The objective of the strategy is to coordinate groundwater monitoring between all agencies that

assess groundwater quality and quantity in the state and work to include all key monitoring components, including:

- A fixed network of groundwater level monitoring locations
- A statewide assessment of groundwater quality
- A fixed network of groundwater quality monitoring sites
- Surface water monitoring stations
- Water use reporting

The groundwater monitoring strategy is integrated into DNR's overall water monitoring plan.

Groundwater Data Management

DNR's consolidated Groundwater Retrieval Network ([GRN](#)) accesses groundwater data from database systems in the Waste & Materials Management, Drinking Water & Groundwater, and Watershed Management programs, including information on approximately 300,000 wells. These wells represent public and private water supply wells, piezometers, monitoring wells, non-potable wells, and groundwater extraction wells. DG staff continued to improve the locational data associated with GRN's wells and the ease with which the data can be accessed.

The DNR's high capacity well and surface water intake data continues to improve. Since the database was developed in 2007, much of the previously existing locational and ownership information has been verified or updated to improve data quality. The improved data quality has helped increase response rates on annual water withdrawal reporting. Between 2008 and 2013, reporting response rates increased from 60% to over 95%. The online reporting system has increased reporting accessibility and improved communication with the user community.

The DNR continued to make progress on several other groundwater-related data initiatives in FY14. DG continued to improve its public water supply well data and coordinated efforts with the RR, WMM, and WT programs to improve the DNR's data on significant potential sources of contamination that may contaminate these wells. With DNR financial support, WGNHS has developed a map-based application to access a varied catalog of hydrogeologic data and related information.

DNR staff updated the DG Mapping Application which is a geographic information system that maps locations of high-capacity wells, trout streams, springs, outstanding water resources and exceptional water resources, public wells, source water areas, and potential contaminant sources within source water areas in a format consistent with high-capacity well approval, public water system vulnerability assessment, wellhead protection, and related drinking water and groundwater needs. Update work began on related applications that use maps of potential contaminant sources along with well construction, monitoring, and geologic information to help determine the susceptibility of public wells to contamination. Design work began on an application to provide on-line, real-time maps that well drillers and realty professionals can use to ensure the safest possible drinking water well location and construction. These applications are at the leading edge of DNR's efforts in integrating spatial and tabular data toward the goal of public health and resource protection.

Remediation and Redevelopment Program

The Remediation and Redevelopment (RR) program has primary responsibility for implementing and aiding cleanups under the Spill Law, the Environmental Repair Law, federal programs (Superfund, Hazardous Waste Corrective Action and Closure, Leaking Underground Storage Tanks (LUST), and Brownfields), , the Drycleaner Environmental Response Fund, Petroleum Environmental Compensation Fund Act, and at closed landfills. The RR program provides technical assistance, helps to clarify legal liability, provides financial assistance primarily to local governmental units, and provides technical project oversight of cleanup projects.

All cleanups are conducted according to the ch. NR 700 rule series, Wis. Adm. Code, Investigation and Remediation of Environmental Contamination, and ch. NR 140, Groundwater Quality. The majority of cleanups are done by persons responsible under the laws, or persons or groups involved in the redevelopment of potentially contaminated properties. Program staff provide technical assistance on cleanups conducted by consultants at the direction of responsible parties. In addition, RR staff contract and direct consultants on state-funded cleanups. The RR Program also provides assistance for spill response, sometimes with the aid of a contractor; and works with other agencies, particularly the U.S. EPA Removals Program, for conducting major spill response actions and removal of hazardous substances when the responsible party is unable or unwilling to do so and there is a risk to public health, welfare, or to the environment.

Cleanup Of Groundwater Contamination

As of mid-June, in FY15, the program spent over \$800,000 in Environmental Fund dollars and over \$200,000 in bonding to initiate or continue environmental cleanup actions at over 28 locations where groundwater contamination is known or suspected. The Environmental Fund is used when contamination is significant but no identifiable private party has legal responsibility for the contamination, the person(s) legally responsible do not have the financial ability to proceed, or the responsible person simply refuses to proceed. Private contractors conduct these cleanups with oversight by DNR staff. Whenever feasible, the RR program and legal staff attempt to recover costs from responsible persons after the cleanups are undertaken.

Investigation, Cleanup and Redevelopment of Brownfields

Brownfields are abandoned, idle, or underused industrial or commercial facilities or sites whose expansion or development is adversely affected by actual or perceived environmental contamination. The RR program coordinates several efforts to encourage local governments and private businesses to cleanup and redevelop brownfield properties. At many brownfields sites, the release of hazardous substances threatens groundwater quality.

The RR Program also provides redevelopment assistance at brownfield sites with groundwater contamination. Program staff assists local governments and private businesses with the cleanup and redevelopment of brownfields by providing technical assistance. In many cases, these properties have groundwater contamination or soil contamination that poses a threat to groundwater.

The RR program also provides a number of different types of assurance, comfort, or general liability clarification letters related to properties with groundwater contamination. Collectively, these letters facilitate the reuse and development of properties. Since 1994, the RR program provided 3000 redevelopment assistant reviews – which can include liability clarification letters, off-site exemption

letters, cleanup agreements for tax delinquent properties, building on abandoned landfill approvals, etc. – at Brownfield properties throughout the state.

The RR program also continues to provide technical assistance and assist parties with voluntary investigations and cleanups of Brownfield properties through the Voluntary Party Liability Exemption (VPLE) process. Many sites that follow the VPLE process have contaminated groundwater.

After a person has conducted an environmental investigation of the property and cleaned up soil and groundwater contamination, the DNR will issue a "Certificate of Completion" which provides a release from future liability for any contamination that occurred on the property prior to issuance of the certificate. Since 1994, the DNR issued 145 certificates of completion

Dry Cleaner Environmental Response Fund (DERF) Program

The DERF program reimburses dry cleaner owners and operators for eligible costs associated with the cleanup of soil and groundwater at sites contaminated by dry-cleaning solvents. Fees paid by the dry-cleaning industry provide program funding. Environmental cleanups at dry cleaner sites are conducted following the ch. NR 700 rule series. There are 230 sites in the program, with 156 at various stages of investigation and cleanup and 74 sites closed. The program is implemented through ch. NR 169, Wis. Adm. Code.

Tracking System and GIS Applications

The program's main database on the status of sites undergoing investigation and/or cleanup is the Bureau of Remediation and Redevelopment Tracking System ([BRRTS](#)).

In 2001, revisions to ch. NR 726, 716, 749, 811, and 812 implemented a Geographic Information System (GIS) Registry of Closed Remediation Sites to replace the requirement to record groundwater use restrictions at the County Register of Deeds Office. In 2002, additional rule revisions required the inclusion of sites with residual soil contamination on the GIS Registry. The GIS Registry currently includes locational information on sites closed with residual groundwater contamination above the ch. NR 140 enforcement standards and sites closed with soil contamination above ch. NR 720 soil standards, as well as site specific information pertaining to where the contamination is on the property in question and at what concentration it was found at the time the closure decision was made. In 2006, the spill law was amended (see s. 292.12, Wis. Stats.) to expand the use of DNR's databases to track sites with residual contamination left in place at the time of case closure.

Inclusion of the [GIS Registry](#) on the Internet provides a means of notifying future owners or users of the property of the existence of soil and/or groundwater contamination, as well as any responsibilities of the property owner (or occupant in some cases) to comply with any conditions of closure. The site specific information is attached to each site by a link to a .pdf.

The GIS Registry is to be used with well construction requirements for private wells, and with a setback distance for new municipal wells. Beginning in July 2004, the DNR made the GIS Registry information available to well drillers through a Well Construction CD that is updated twice a year. Before drilling, well drillers are asked to consult the CD to determine if a well is proposed for a property listed on the Registry. If the proposed well is located on a closed remediation site, then the driller must contact

regional Drinking Water and Groundwater staff prior to any well construction activities to determine if additional casing or other construction techniques may be required.

In 2005, an expanded GIS application was made available, called the [RR Sites Map](#). This application shows the locations of the majority of sites available on BRRTS (open and closed), or provides an address for those sites for which geolocational coordinates have not yet been obtained. In 2008, additional data regarding financial tools and liability clarification actions were added, so RR Sites Map now provides even more information on redevelopment and cleanup activities. In June of 2013, RR Sites Map was migrated to Geocortex where it obtained a new look, but kept the same functionality.

The GIS applications are linked to BRRTS on the Web and are all useful for locating potential contamination sites when evaluating new municipal well placement or for property transactions. These databases make site specific information on open and closed remediation sites much more available and accessible to the public and specific interested groups, particularly those wanting to install or replace a potable well on an affected property, as well as those buying properties. Sites regulated by the Department of Agriculture and the Trade and Consumer Protection are also included in BRRTS on the Web, the GIS Registry, and RR Sites Map.

The RR Program continues to make improvements to both BRRTS and the GIS applications. In addition to the ongoing programming efforts, work continues on quality assurance and quality control (QA/QC) of existing data.

Waste and Materials Management Program

Monitoring Groundwater Quality Around Landfills

Waste and Materials Management Program (WMM) implements the DNR's Groundwater Standards Program in several ways during the life of a landfill. When staff review an applicant's "Feasibility Report," which proposes to site a landfill at a particular location, they review baseline groundwater data submitted by the applicant to determine whether exemptions and alternative concentration limits (ACLs) to the established ch. NR 140 groundwater standards are needed for the public health and welfare parameters, based on the concentrations of those substances present in the groundwater before landfill development. In addition, reviewers establish preventive action limits (PALs) for indicator parameters based on statistical calculations of the baseline concentrations.

During the active life of a landfill and after closure, staff review routine groundwater detection monitoring data, collected and submitted by the landfill owner at sites where monitoring is required to determine compliance with ch. NR 140 standards and site-specific ACLs and PALs. Ch. NR 140 provides a list of response actions that the DNR may require a facility to take after a groundwater standard exceedance is confirmed. Should conditions warrant, staff require groundwater investigation reports that include proposals for further evaluations and recommendations for remediation at landfills that exceed groundwater standards. Staff review results of site investigations triggered by the exceedances of groundwater standards and evaluate the effectiveness of remedial actions at active solid waste facilities and closed landfills by comparing results to groundwater standards and by looking at concentration trends over time.

WMM accepts only electronic submittal of environmental monitoring data from landfill owners, labs, and consultants. The electronic data submittals are currently uploaded by DNR to the WMM Groundwater and Environmental Monitoring System (GEMS) database. WMM provides access to the environmental

monitoring data contained in GEMS by using “GEMS on the web.” In addition to enhancing “GEMS on the web” to allow more flexibility in choosing a specific date range and particular monitoring points, WMM is seeking resources to program a web interface, possibly using the Department’s Data Portal and/or Web Access Management System, so that facilities can upload environmental monitoring data into GEMS.

WMM Program is placing stronger emphasis on having facilities collect water samples for VOC analysis rather than for indicator parameters, in exchange for a reduced sampling frequency. VOCs are a key contaminant used to determine water supply well vulnerability to contamination and set monitoring requirements.

WMM continues to co-lead the Interagency Pharmaceutical Waste Working Group, with UW-Extension and diverse partners. Keeping pharmaceuticals out of household and industrial waste streams is the main way to reduce the risk that the substances will reach groundwater through landspreading or septic systems.



Bags of pharmaceuticals collected by Jefferson County as part of effort to keep pharmaceutical waste out of the groundwater. *Photo credit: Barbara Bickford*

Monitoring Groundwater Quality Around Metallic Mines

The Waste and Materials Management Program regulates metallic mining activity in the state. Issues related to groundwater quantity and groundwater quality are critical in determining whether a proposed mining project receives necessary approvals. State statutes have created separate approval processes for non-ferrous mining projects (Chapter 293, Stats.) and ferrous mining projects (Chapter 295, Stats.). The regulatory framework for ferrous mining projects was recently created through enactment of 2013 Wisconsin Act 1 in March of 2013. The law created a process by which iron mining projects are evaluated and includes provisions related to groundwater withdrawals, mining waste site design and operation and protection of groundwater quality. The law requires compliance with existing groundwater quality standards but establishes point of standards application and evaluation processes and criteria that are unique to ferrous mining projects.

On March 24, 2015, the Department received notification from Gogebic Taconite, LLC that they are withdrawing their pre-application for the proposed ferrous mining project in Iron and Ashland Counties. Groundwater monitoring wells on the property are in the process of being abandoned.

Water Quality Program

The Bureau of Water Quality (WQ) is responsible for statewide implementation of DNR’s groundwater standards primarily through the issuance of discharge permits to facilities, operations, and activities that discharge treated wastewater and residuals to groundwater.

Wastewater Discharges

WQ issues Wisconsin Pollutant Discharge Elimination System (WPDES) permits to all communities, industrial facilities, and large privately owned wastewater systems which discharge treated domestic or industrial wastewater to groundwater through land treatment/disposal systems. These systems are primarily spray irrigation, seepage cell, subsurface absorption systems, and ridge & furrow treatment systems regulated under ch. NR 206, Wis. Adm. Code (domestic wastewater) and ch. NR 214, Wis. Adm. Code (industrial wastewater). WPDES permits issued to these facilities contain groundwater monitoring and data submittal requirements that are used to evaluate facility compliance with ch. NR 140, Wis. Adm. Code (groundwater quality standards). Groundwater monitoring systems at existing facilities are evaluated and upgraded as necessary at permit re-issuance. In 2015, DNR issued 10 new permits for municipal and industrial facilities that discharge directly to land disposal (groundwater), bringing the total number of such permits to 214.

DNR also regulates the land application of organic industrial wastes, municipal biosolids and septage (chapters NR 214, 113, and 206) through approval of land spreading sites and requirements on locations, loading rates, nutrient levels, and time of year. In recent years, as the quantities of these materials and agricultural manure have increased, competition for acceptable land spreading sites has increased, particularly in some areas of the state. Some instances of unacceptable impacts to groundwater have occurred associated with these activities. In addition, DNR has pushed land spreading entities to provide for more storage capacity to minimize winter and spring runoff to surface water. As a result, wastewater generators and haulers have sought to utilize existing tanks and lagoons, and in some cases, substandard earthen manure pits or substandard storage tanks. The industrial wastewater program has affirmed code requirements to insure older structures meet the standards needed to assure storage is environmentally sound, protective of both groundwater and surface water.

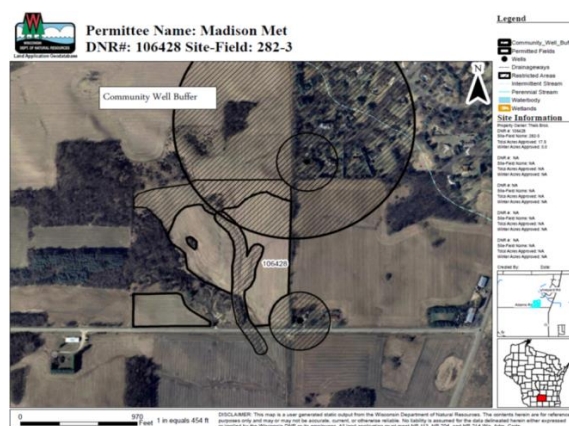
WQ maintains a database, designated the System for Wastewater Applications, Monitoring, and Permits (SWAMP), for holders of specific WPDES and general permits. This database system stores facility-specific information such as address, contacts, location, permit requirements, monitoring results, and violations of permit requirements for private and municipal wastewater treatment facilities. The system contains current information on groundwater, wastewater, and biosolids treatment/management. Historical sampling data from groundwater monitoring wells is available through the system and current sample results are added on a monthly basis. Sampling results and site loading information are also available for land application of municipal biosolids, septage and industrial sludge, by-product solids, and wastewater.

WQ assists and participates in local planning efforts for existing developed areas (served by onsite wastewater treatment systems) that are investigating the possibility of providing a public sewerage system.

DNR continues to monitor the Nondomestic Wastewater to a Subsurface Soil Absorption System general permit it reissued in 2011; the general permit is in use at 25 sites. The requirements for requesting a permit, and for renewing permit coverage, revisit the setback requirements for changes due to new water supply wells during the previous permit period. The general permit is renewed every five years. The renewal process provides for identifying land use changes that may have occurred. This will serve as a check on groundwater and public health protection, and could also identify future concerns and permit needs.

Septage and Sludge Management

Wisconsin Act 347 provides incentives for more wastewater treatment plants to accept and treat septage. This is accomplished through the offer of a zero percent Clean Water Fund loan for the planning and construction of receiving facilities, and additional



Clearer, more easily-produced maps in permits to land-apply wastes now help protect community and school water supply wells.

capacity provided for septage. Facilities which are upgrading capacity by more than 20% must evaluate septage generation and available disposal options in their planning area during facility planning. Although they are not mandated to provide such capacity, they are offered the zero percent loan if they do so. Structures are provided by which publicly owned treatment works establish costs for receipt of septage and a process is laid out for dispute resolution when such costs are questioned. Land application also remains a viable option when appropriate and Act 347 provides explicit pre-emptive authority to the state by disallowing restrictive local ordinances if they are not identical to state regulations.

Watershed Management Program

The Bureau of Watershed Management (WT) is responsible for statewide implementation of DNR's groundwater standards primarily through the issuance of discharge permits to concentrated animal feeding operations (CAFO) and dischargers of contaminated storm water. Field staff carries out compliance and enforcement activities using policies, codes, and guidelines intended to meet groundwater quality standards. Integrated basin planning carried out in the field under guidelines developed by WT assess and evaluate groundwater (as well as surface water) and provide general and specific recommendations for the protection and enhancement of the basin's groundwater.

Agricultural runoff and groundwater quality

Chapter NR 243 Wis. Adm. Code covers Wisconsin Pollutant Discharge Elimination System (WPDES) permit requirements for livestock operations and contains provisions to protect surface water, groundwater and wetlands in Wisconsin. Revisions made to ch. NR 243 have improved groundwater protection associated with CAFO land application practices by increasing setback requirements from community/non-community public wells and karst features and by further restricting winter applications of manure. Nutrient management plans submitted as part of the issuance of WPDES permits to CAFOs address how, when, where, and in what amounts CAFOs apply manure, process wastewater, and associated nutrients to cropped fields to protect surface waters and groundwater. Groundwater monitoring has been conducted voluntarily and as a requirement at selected sites. In response to monitoring, significant groundwater contamination is being addressed in 2014 by renovation of a feedlot through DNR compliance processes. The DNR also promotes groundwater protection through the implementation of agricultural performance standards in ch. NR 151, Wis. Adm. Code, the issuance of Notices of Discharge under ch. NR 243, and response to acute manure related groundwater impacts (e.g., well contaminations).

Currently 248 livestock operations are covered under discharge permits issued (87% dairy; 4% poultry; 5% swine; 4% beef). Regional and central office staff have successfully maintained the permit backlog at less than 15%. The trend of growing numbers of permit applications for larger-scale livestock operations is expected to continue.

Sections ch. NR 151.07 and ATCP 50.04(3) require all crop and livestock producers to develop and implement nutrient management plans. Technical Standard NRCS 590 contains planning and implementation requirements for all nutrient management plans. DNR staff are participating in the NRCS effort to update its technical standard for nutrient management plans to reflect new federal water quality protection criteria, including a nitrogen loss risk assessment.⁷

Federal, state, and local agencies maintain technical resources and expertise to implement NRCS Standard 590, including development and dissemination of the field-based Soil Nutrient Application

Program (www.snapplus.net) in cooperation with the University of Wisconsin. Implementation of the ch. NR 151 performance standard cannot be required without cost sharing in many situations. A multi-partner conservation consortium was effective in securing cost share resources from the Legislature to help farmers meet nutrient management plan requirements. DATCP administers these funds through its Soil and Water Resource Management Program. In addition, the NRCS provides cost sharing for development and implementation of comprehensive nutrient management plans, including 590 compliant planning and implementation. In other situations, cost sharing does not have to be provided to require compliance. This includes compliance for farms operating under a WPDES Animal Feeding Operation Permit, farms receiving state farmland preservation tax credits under the state's Working Lands Program, livestock operations obtaining local permits under the state Livestock Siting Law, and livestock operations that voluntarily apply for new or altered manure storage facilities when the local regulation requires development and implementation of a nutrient management plan.

DNR promulgated a revised ch. NR 151 performance standard, which will require DATCP to amend ATCP 50 and 51, via rulemaking. Changes included in the ch. NR 151 revisions may impact nutrient management plan development and implementation. These changes include: TMDL's; soil erosion and pastures; tillage setback; phosphorus index; process-wastewater discharge prohibitions; nutrient management plan clarifications on municipal sludge, industrial waste or septage; and an explanation on how these sources may impact nutrient management plans. The DNR has also provided comments to DATCP to help make implementation of ch. NR 151 more consistent across the state.

Storm Water and groundwater quality

Storm water discharges are regulated as required under the federal Clean Water Act under Chapter NR 216, Wis. Adm. Code. Chapter NR 216 requirements include: 1) permits for nearly 220 municipalities in Wisconsin to control polluted runoff that may enter their municipal separate storm sewer systems (MS4s); 2) permits for owners of construction sites with one or more acre of land disturbance to control erosion during construction and to install practices to limit post-construction pollutant discharge after construction is completed; and 3) permits for certain industrial facilities to address potential contamination of storm water from outside activities and outdoor storage of materials.

In addition, under Chapter NR 151, Wis. Adm. Code, the DNR has developed runoff performance standards for MS4s and construction sites that are implement through the storm water permit program. Chapter NR 151 was updated and those changes became effective on January 1, 2011.

Provisions to implement Chapter NR 216 and the performance standards in Chapter NR 151 are included in several general permits. The MS4 general permit for municipal storm water discharges was first issued on in January 2006. . The MS4 general permit was reissued in May 2014. The general permit to regulate storm water discharges from construction sites was reissued on September 30, 2011. There are 5 general permits that cover industrial activity, including heavy manufacturing, light manufacturing, scrap recycling, vehicle dismantling, and non-metallic mining.